

Problem and Objective Statements

Ecosystem Quality

Problem

The Bay-Delta system no longer provides a broad diversity of habitats nor the habitat quality necessary to maintain ecological functions and support healthy populations and communities of plants and animals. Much of the public focus on ecosystem problems has centered on fisheries, especially those populations which have been designated as threatened or endangered under Federal and State laws. Declining fish populations and endangered species designations have generated major conflicts among beneficial uses of water in the Bay-Delta system. The underlying problems, however, are much broader and more far-reaching than a decline in fish. The health of the Bay-Delta ecosystem has declined in response to a loss of habitat to support various life stages of aquatic and terrestrial biota and a reduction in habitat quality due to several factors.

The steady decline in habitat quantity, quality, and diversity results from many activities both in the Delta and upstream. The earliest major damaging event was the unrestricted use of hydraulic mining in the river drainage along the eastern edge of the Central Valley, which greatly increased the amount of sediment entering the river systems. The hydraulic mining resulted in habitat degradation in Central Valley streams as channel beds and shallow areas filled with sediment. The reduced capacity of the sediment-filled channels resulted in an increase in frequency and extent of periodic flooding. This accelerated the need for flood control measures to protect adjacent agricultural lands. Levee construction to protect these lands eliminated fish access to shallow overflow areas, and dredging operations to construct levees eliminated tule bed habitat along the river channels. Since the 1850's, 700,000 acres of overflow and seasonally flooded land in the Delta have been converted to agriculture or urban uses. Many of the remaining stream sections have been dredged or channelized to improve navigation, increase stream conveyance during periods of flood, and facilitate water export.

Upstream water development, depletion of natural flows, and the export of water from the Delta have changed seasonal patterns of inflow, reduced annual outflow and reduced the natural variability of flows into and through the Delta. Facilities constructed to support water diversions cause straying or direct losses of fish (e.g. unscreened diversions) and increased predation (e.g. Delta cross channel and Clifton Court Forebay). Entrainment and export of substantial quantities of food web organisms (eggs, larvae and young fish) further added to habitat decline.

Habitat alteration and water diversions are not the only factors that have caused ecosystem problems. Water quality degradation caused by pollutants and increased concentrations of substances such as pesticides and herbicides, may also have contributed to the overall decline in the health and productivity of the Delta. In addition, undesirable introduced

species compete for available space and food supplies, sometimes to the detriment of native or economically important introduced species.

Objectives

The goal for ecosystem quality is to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta system to support sustainable populations of diverse and valuable plant and animal species. This can be accomplished by addressing several objectives which collectively improve and increase important habitat types and quality including shallow water, shaded riverine aquatic, tidal slough, brackish and freshwater marsh, and riparian woodland. These habitats provide essential areas for activities that include breeding, foraging, resting, avoiding predators, and overwintering. The ecosystem quality objectives in summary form are:

- Increase the amount of shallow riverine, shaded riverine, tidal slough and estuary entrapment/null zone **habitats for aquatic species**
- Improve the in-Delta, **upstream and downstream movement** of larval, juvenile and adult species
- Reduce **water quality** degradation
- Increase the amount of brackish tidal marsh, freshwater marsh, riparian woodland, breeding waterfowl, wintering wildlife, managed permanent pasture and flood plains and associated riparian **habitats for wildlife species**
- Contribute to the recovery of **threatened or endangered species** and species of special concern

These improvements are intended to increase population health and population size for wildlife and estuarine and anadromous fish to levels that assure sustained survival.

Linkages

Improvements to ecosystem quality are also directly linked to improvements for water supply reliability, water quality, and the levee system integrity.

The decline of species dependent on the Bay-Delta system for all or part of their life cycle contributes to conflict among beneficial uses of the Delta and highlights the urgent need for ecosystem restoration. Key issues which affect ecosystem quality are water export, outflow, levee and channel maintenance, introduced species, recreational boating, pollutants, and unscreened diversions.

Water Supply Reliability - Ecosystem quality can be restored or improved through changes in export timing and the method(s) of export. Enhanced flexibility in diversion and export activities can contribute significantly to restoration of beneficial flow patterns. If additional water supplies are developed in an environmentally sensitive manner or water needs are reduced, more functional Delta outflow can be provided at critical times.

Water Quality - Another issue which affects ecosystem quality is the water quality of the Bay-Delta system. Improved water quality directly improves the survival of aquatic species and can expand the usable habitat area benefiting the species.

Levee System Integrity - Improvement in levee maintenance and stabilization can be achieved by incorporating habitat restoration with levee and channel improvements. If the conflicts over levee maintenance versus habitat could be addressed, levees could be rebuilt or improved using sound levee stabilization techniques which incorporate waterside berms that provide habitat elements such as shaded riverine aquatic and riparian. Additional habitat restoration could also be accomplished during efforts to address Delta island subsidence.

Phase II Alternatives

The three phase II Alternatives were designed to address the Program objectives and to take advantage of the linkages from improvements in all four resources categories. Each alternative includes many features to improve ecosystem quality:

- The comprehensive ecosystem restoration program will provide for increased levels of important aquatic and terrestrial habitats.
- Levee system improvements will provide new habitat corridors and reduced risk of catastrophic failure that could damage habitat or degrade water quality for the environment.
- Improved water supply reliability and flexibility will reduce diversion effects on fisheries and provide for improved timing of environmental flows.
- Water quality improvements will directly benefit ecosystem health and survival of species.